

REMARKS

By the present *Response and Amendment After Final Office Action* (hereinafter, "*Response*"), claims 1, 24, and 35 are amended, and claims 2 and 36 are canceled. The amendments to the claims are supported by the application as originally filed and are from formerly dependant claims, and do *not* introduce new matter issues or raise issues requiring further consideration or searches.

REJECTION OF CLAIMS 1-3, 5, 11, 15, 16, 34-36, 38, 41, AND 45 UNDER 35 U.S.C. § 103(a)

Claims 1-3, 5, 11, 15, 16, 34-36, 38, 41, and 45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,538,020 to Heskett et al. ("Heskett"). Applicant respectfully traverses this rejection in view of the clarification to these claims.

Currently amended claims 1-3, 5, 11, 15, 16, 34-36, 38, 41, and 45 recite that a gas filter of the present invention comprises an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C. As acknowledged by the Examiner, Heskett does not teach a gas filter with the properties recited in the claims of the present invention. Respectfully, neither Heskett, nor the combination of Heskett with the knowledge known to a skilled artisan, may render pending claims 1-3, 5, 11, 15, 16, 34-36, 38, 41, and 45 obvious.

In addition, the Examiner stated that "the claims do not contain any limitation concerning type(s) of sorption utilized ..." and "[i]t is argued that neither Heskett, nor the teaching references providing a combination of adsorption and absorption processes. However, again such combination of characteristics/properties or process is not claimed." Applicant respectfully submits that currently amended claims 1-3, 5, 11, 15, 16, 34-36, 38, 41, and 45 now recite limitations concerning type(s) of sorption utilized and combinations of characteristics/properties noted by the Examiner as missing, i.e., wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than

about 20 °C.

The gas filter of the present invention is the first known gas filter with the superior characteristics recited in the claims of the present invention. Most of the technologies used to date to remove volatile and semi-volatile compounds from an air stream rely on adsorption, as opposed to absorption, as a mechanism for trapping these compounds. Adsorption is a process whereby volatile molecules condense onto a surface of a filtration media. Because essentially only a monolayer of molecules can adsorb, it is necessary to provide very high surface areas in order to achieve significant loadings of the adsorbed compounds. In addition, as adsorption proceeds and the available surface for adsorption decreases, the rate of adsorption also decreases.

Moreover, since all adsorbed molecules compete for the same surface sites, the presence of an innocuous adsorbent (such as water) can greatly reduce the capacity of the adsorbent for target volatile compounds. Despite these drawbacks, adsorption is the predominant route chosen to trap volatile organic compounds, primarily because it is considered by those skilled in the art to be the only method that has a kinetic rate great enough to be effective for removing significant levels of pollutants from an air stream.

The present invention as claimed overcomes the deficiencies associated with gas filters known in the art by providing gas filters, and methods of making thereof, which utilize both adsorption and absorption processes such that the resulting gas filters exhibit a desirable filtering load capacity. None of Heskett, the general knowledge of the art, or a combination thereof, teaches a gas filter with the superior characteristics recited in the claims of the present invention. Particularly, none of Heskett, the general knowledge of the art, or a combination thereof, teaches a method for making such superior gas filter. Simply combining those polymers and adsorption additives as disclosed in Heskett or generally known in the art using methods generally known in the art and/or taught in Heskett will not result in a gas filter with the superior characteristics recited in the claims of the present invention, i.e., there is no reasonable expectation of success.

Applicant therefore respectfully submits that claims 1-3, 5, 11, 15, 16, 34-36, 38, 41, and 45 are in condition for allowance.

REJECTION OF CLAIMS 4 AND 37 UNDER 35 U.S.C. § 103(a)

Claims 4 and 37 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heskett and further in view of U.S. Patent No. 3,936,394 to Kusanose et al ("Kusanose").

Applicant respectfully traverses this rejection in view of the clarification to these claims.

Similar to what is discussed, *supra*, neither Heskett, Kusanose, nor the general knowledge of the art, alone, or combinations thereof, teach a gas filter comprising an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C, limitations now recited in claims 4 and 37. That Kusanose teaches "polyacrylamide or similar polymers in a gas adsorption filter" does not cure this defect.

In addition, because none of Heskett, Kusanose, the general knowledge of the art, or combinations thereof, teach a method for making a gas filter with the superior characteristics recited in the claims of the present invention, simply combining those polymers (e.g., polyacrylamide) and adsorption additives as disclosed in Heskett, Kusanose, and/or generally known in the art using methods generally known in the art and/or taught in Heskett and/or Kusanose will not result in a gas filter with the superior characteristics recited in the claims of the present invention. There is no reasonable expectation of success, i.e., a *prima facie* case of obviousness could not be established.

It is therefore respectfully submitted that claims 4 and 37 are in condition for allowance.

REJECTION OF CLAIM 8 UNDER 35 U.S.C. § 103(a)

Claim 8 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heskett and further in view of U.S. Patent No. 6,352,579 to Hirata et al ("Hirata"). Applicant respectfully traverses this rejection in view of the clarification to the claim.

Similar to what is discussed, *supra*, neither Heskett, Hirata, or the general knowledge of the art, alone, nor combinations thereof, teach a gas filter comprising an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C, limitations now recited in claim 8. That Hirata teaches sulfonic acid as an additive does not cure this defect.

Also similar to what is discussed, *supra*, because none of Heskett, Hirata, the general knowledge of the art, or combinations thereof, teach a method for making a gas filter with the superior characteristics recited in claim 8 of the present invention, simply combining those polymers and adsorption additives (e.g., an additive comprising a sulfonic acid moiety) as disclosed in Heskett, Hirata, and/or generally known in the art using methods generally known in the art and/or taught in Heskett and/or Hirata will not result in a gas filter with the superior characteristics recited in claim 8 of the present invention. There is no reasonable expectation of success, i.e., a *prima facie* case of obviousness could not be established.

Applicant therefore respectfully submits that claim 8 is in condition for allowance.

REJECTION OF CLAIMS 7, 9, 12, 18, 20-22, 24, 33, AND 42-44 UNDER 35 U.S.C. § 103(a)

Claims 7, 9, 12, 18, 20-22, 24, 33, and 42-44 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heskett and further in view of Kusanose. Applicant respectfully traverses this rejection in view of the clarification to these claims.

As discussed, *supra*, neither Heskett, Kusanose, nor the general knowledge of the art, alone, or combinations thereof, teach a gas filter comprising an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C, limitations now recited in claims 7, 9, 12, 18, 20-22, 24, 33, and 42-44. That Kusanose further teaches an additive comprising an amine, "a laminate structure having ability to withstand fluid pressure and tensile stress," a substrate, and materials having biostat properties, does not cure this defect.

Also similar to what is discussed, *supra*, because none of Heskett, Kusanose, the general knowledge of the art, or combinations thereof, teach a method for making a gas filter with the superior characteristics recited in claims 7, 9, 12, 18, 20-22, 24, 33, and 42-44 of the present invention, simply combining those polymers, additives (e.g., an additive comprising an amine), laminated structures, substrates, and/or materials having biostat properties as disclosed in Heskett, Kusanose, and/or generally known in the art using methods generally known in the art and/or taught in Heskett and/or Kusanose will not result in a gas filter with the superior

characteristics recited in claims 7, 9, 12, 18, 20-22, 24, 33, and 42-44 of the present invention. There is no reasonable expectation of success, i.e., a *prima facie* case of obviousness could not be established.

It is respectfully submitted that claims 7, 9, 12, 18, 20-22, 24, 33, and 42-44 are in condition for allowance.

REJECTION OF CLAIMS 10 AND 40 UNDER 35 U.S.C. § 103(a)

Claims 10 and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Heskett and further in view of U.S. Patent No. 6,057,488 to Koper et al. ("Koper"). Applicant respectfully traverses this rejection in view of the clarification to these claims.

Similar to what is discussed, *supra*, neither Heskett, Koper, nor the general knowledge of the art, alone, or combinations thereof, teach a gas filter comprising an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C, limitations now recited in claims 10 and 40. That Koper further teaches using nanostructured adsorbents does not cure this defect.

Also similar to what is discussed, *supra*, because none of Heskett, Koper, the general knowledge of the art, or combinations thereof, teach a method for making a gas filter with the superior characteristics recited in claims 10 and 40 of the present invention, simply combining those polymers, additives, and/or nanostructured adsorbents as disclosed in Heskett, Koper, and/or generally known in the art using methods generally known in the art and/or taught in Heskett and/or Koper will not result in a gas filter with the superior characteristics recited in claims 10 and 40 of the present invention. There is no reasonable expectation of success, i.e., a *prima facie* case of obviousness could not be established.

Applicant therefore respectfully submits that claims 10 and 40 are in condition for allowance.

REJECTION OF CLAIM 17 UNDER 35 U.S.C. § 103(a)

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Heskett and

further in view of Hirata and Kusanose. Applicant respectfully traverses this rejection in view of the clarification to the claim.

Similar to what is discussed, *supra*, neither Heskett, Hirata, nor the general knowledge of the art, alone, or combinations thereof, teach a gas filter comprising an absorptive system that contains a polymer matrix, wherein the absorptive system comprises an absorption capacity of at least about 0.01 gram of captured contaminants per gram of the absorptive system or a water content of at least about 5 percent by weight, and wherein the polymer matrix comprises a polymer having a diffusivity of greater than about 10^{-8} cm²/sec or a T_g of less than about 20 °C, limitations now recited in claim 17. That Hirata and Kusanose teach polyacrylamide and sulfonic acid as an additive does not cure this defect.

Also similar to what is discussed, *supra*, because none of Heskett, Hirata, Kusanose, the general knowledge of the art, or combinations thereof, teach a method for making a gas filter with the superior characteristics recited in claim 17 of the present invention, simply combining those polymers (e.g., polyacrylamide) and additives (e.g., an additive comprising an amine) as disclosed in Heskett, Hirata, Kusanose, and/or generally known in the art using methods generally known in the art and/or taught in Heskett, Hirata, and/or Kusanose will not result in a gas filter with the superior characteristics recited in claim 17 of the present invention. There is no reasonable expectation of success, i.e., a *prima facie* case of obviousness could not be established.

It is therefore respectfully submitted that claim 17 is in condition for allowance.

FEES

This *Response* is being filed within two months of the *Final Office Action*, thus no extension fees are believed due. The number of claims pending is less than that of claims originally filed, thus no claim fees are believed due.

Nonetheless, should any fees be due, authorization to charge deposit account No. 20-1507 is hereby expressly given.

CONCLUSION

By the present *Response*, the Application has been in placed in full condition for allowance. Accordingly, Applicant respectfully requests early and favorable action. Should the Examiner have any further questions or reservations, the Examiner is invited to telephone the undersigned Attorney at 404.885.2773.

Certificate of Transmission:

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Respectfully submitted,

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